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PATENT ABSTRACTS OF JAPAN

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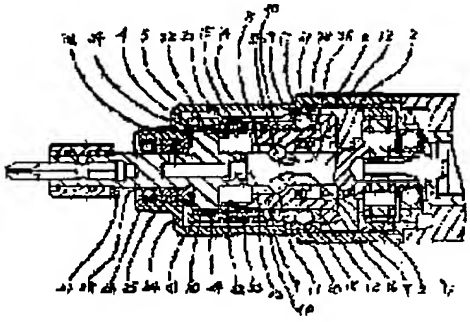
(54) IMPACT DRIVER

(57)Abstract:
PROBLEM TO BE SOLVED: To obtain an impact driver of low noise and low reaction by nonadhesively winding a portion where a clutch spring is pulled and extended in an axial direction.
SOLUTION: The wire cross section shape of a clutch spring 5 is rectangular and is formed to be an adhered state on an anvil 4 and to be a state that a gap is provided between each wire 40 in a hammer 3 part. Because the hammer 3 retreats by prescribed quantity, a gap through which the tip part 35 of the clutch spring 5 passes is made between a restraining ball 19 and a release ring 38 and is released from restraining. Then, the clutch spring 5 expands up to its original diameter, is separated from a cylinder inner surface 14, is going to return to its original length and contracts in the direction of the anvil 4, but wires 40 each other collide and impact sound is not produced because inter-wire 40 is opened.



LEGAL STATUS

[Date of request for examination]

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CLAIMS

[Claim(s)]

[Claim 1] The driving shaft which rotates by the motor and has a cam groove on a periphery. The hammer which is stopped by the ball which fits loosely into this driving shaft, is energized by shaft orientations with a spring, and rotates the inside of this cam groove, and rotates and moves [shaft-orientations]. Annville which is arranged on this hammer and the same axle and grasps a tool at a nose of cam. The clutch spring which is arranged in the shape of a coil ranging over the cylinder side of this hammer and the both sides of this Annville, transmits the driving force of this hammer to this Annville intermittently, and is extended to shaft orientations according to the amount of shaft-orientations retreat of this hammer. It is the shock driver equipped with the above, and the aforementioned clutch spring is characterized by having the portion by which the adhesion volume is carried out, and the portion by which an adhesion volume is not carried out.

[Claim 2] The part to which the adhesion volume of the aforementioned clutch spring is not carried out is a shock driver according to claim 1 characterized by including the part extended to the shaft orientations of the aforementioned clutch spring at least.

[Claim 3] The part extended to the shaft orientations of the aforementioned clutch spring is a shock driver according to claim 1 to 2 characterized by being between aforementioned Annville and the aforementioned hammer at least.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the noise of a shock driver, and reactionary reduction.

[0002]

[Description of the Prior Art] Although the rotation blow tool in the former generated torque and worked thread fastening etc. by hitting intermittently and shockingly the presser foot stitch tongue which a hammer has, and the presser foot stitch tongue which Annville has, since it was a shock blow, it had generated a loud noise. Although noise has been reduced by generating rotation torque intermittently through a clutch spring between a hammer and Annville, there is the need of making noise low as much as possible further.

[0003]

[Problem(s) to be Solved by the Invention] SETTENGU [it / a clutch spring gives the Annville outer diameter and an interference, and twines them, and] so that a hammer may have a crevice slightly to a bore, an outer diameter, and each. If a clutch spring has an edge stopped by the stop ball when a driving shaft is rotated from this state, and load torque increases While it is closed so that the periphery of a hammer may be imitated and a coil diameter may become small, and transmitting torque to Annville, a hammer with the steel ball in a driving shaft In order that an end may be fixed by Annville and the stop ball in a hammer may stop the other end as well as moving in the direction pulled apart from Annville within a driving shaft cam groove, a clutch spring is extended and becomes easy to be extended in the place which a hammer takes from Annville by which it is closed especially strongly. When a hammer reaches a position, a stop ball releases the edge of a clutch spring, and it is shortened by the extended spring to the original length. Since making it an adhesion volume in order that a clutch spring may lessen the space of shaft orientations more at this time was generally performed, when coils hit, noise had occurred.

[0004] The purpose of this invention is offering the shock driver which abolishes the collision of the coils of a spring, loses generating of the noise at the time of thread-fastening work, and generates intermittent rotation torque certainly.

[0005]

[Means for Solving the Problem] The above-mentioned purpose is attained by making into a non-sticking volume the part to which a clutch spring is pulled by shaft orientations and extended while a blow child's presser foot stitch tongue and the presser foot stitch tongue of a hit child are lost, it arranges so that a blow child and a hit child may not contact directly, and telling rotation torque intermittently through a clutch spring.

[0006]

[Embodiments of the Invention] As shown in drawing 1 , a driving shaft 2 has two driving shaft cam grooves 6 and 7 drilled in the periphery, and the hammer 3 which fits loosely into a driving shaft 2 has the hammer cam grooves 8 and 9 which face the driving shaft cam grooves 6 and 7, is stopped by the steel balls 10 and 11 which intervene in the meantime, and is energized by the compression spring 12 at the Annville 4 side. Furthermore, in order to contain a clutch spring 5 on a hammer 3, a driving shaft 2 and the cylinder slot 13 which forms the cylinder container-liner side 14 and the cylinder outer case side 15 on a concentric circle are drilled in the direction of a path. the circular holes 17 and 18 are established in the outer case side 15 of the position near the base 16 of the cylinder slot 13 at two places of a position which 180 each face, it is alike, respectively, and the slightly small hanging balls 19 and 20 are contained from the circular holes 17 and 18 At this time, the width of face of the cylinder slot 13 is set up more narrowly than the radius of the hanging balls 19 and 20. Furthermore, about shaft orientations, the field which faces Annville 4 has two taper sides 21 and 22 which faced the field of Annville 4, and is established with the field and crevice between Annville 4. It equips a hammer 3 side with the stop ring 28 for regulating movement while Annville 4 which faces a hammer 3 has the stowage 23 contained free [rotation of the end face of a driving shaft 2], and a centering is carried out to the bearing 25 and 26 provided in housing 24 and it forms the nose-of-cam tool applied part 27 in an end. It has the cylinder slot 31 and two taper sides 32 and 33 which form the container-liner side 29 and the outer case side 30 in the field which faces a hammer 3 to the cylinder slot 13 of a hammer 3, and the hole 34 is formed in one place of the pars basilaris ossis occipitalis of the cylinder slot 31. A clutch spring 5 is contained by a hammer 3, the cylinder slot 13 established in Annville 4, and the cylinder slot 31. The strand cross-section configuration of a clutch spring 5 is a square shape, and it is fabricated in hammer 3 portion between each strand 40 so that it may grow into the state of having a crevice so that it may

grow into the state where it was stuck on Annville 4. As shown in drawing 2 , both ends 35 and 36 are bent in parallel with an axial center. While the clutch spring 5 in a hammer 3 is contained with the cylinder container-liner side 14, the cylinder outer case side 15, and few crevices, the edge 35 is in a base 16 side further from the position of the stop balls 19 and 20, and it is contained with a base 16 and few crevices. Moreover, a hole 34 is equipped with the edge 36 of the clutch spring 5 in Annville 4, and it is contained without an abbreviation crevice to the container-liner side 29 and the outer case side 30. On the other hand, the release ring 38 which has an inclined plane 37 in part is installed by housing 24 on the periphery of the stop balls 19 and 20.

[0007] Operation of the shock driver 1 constituted as mentioned above is explained. At the time of screw bundle work, a rotation drive is carried out by the motor which is not illustrated, and a driving shaft 2 transmits turning effort to the hammer 3 energized by the compression spring 12 through the steel balls 10 and 11. Rotation is begun, the edge 35 of a clutch spring 5 is stopped by the stop ball 19, and a hammer 3 transmits turning effort to Annville 4 through a clutch spring 5. At this time, an edge 35 begins rotation, while the press component of a force works on the stop ball 19 and pushes the stop ball 19 in the release ring 38 direction, since it is stopped in the lower part of the stop ball 19. A rotation difference arises between Annville 4 and a hammer 3 with the load of the screw which is not illustrated, and it becomes tight in the direction in which an outer diameter becomes small, it coils around a hammer 3, the cylinder container-liner side 14 of Annville 4, and the container-liner side 29, and rotates to one.

[0008] Next, if load torque increases further as shown in drawing 3 , since the hammer 3 is made one by Annville 4 and the clutch spring 5, only a driving shaft 2 tends to continue rotation, and the driving shaft cam grooves 6 and 7, the hammer cam groove 8, and the steel balls 10 and 11 pinched among nine will resist the energization force of a compression spring 12, and will move it in the driving shaft cam groove 6 and the direction which pulls apart a hammer 3 from Annville 4 within seven. However, a clutch spring 5 is extended to shaft orientations bordering on the part which was hard to move since frictional force was also committing the clutch spring 5 which frictional force is more large and is fixed on Annville 4 since a clutch spring 5 has the outer diameter of Annville 4 larger than the bore of a clutch spring 5 on Annville 4 and it has an interference, and coils on a hammer 3, and has floated slightly between a hammer 3 and Annville 4. Furthermore, a hammer 3 moves and the edge 35 of a clutch spring 5 extrudes the stop ball 19 to the inclined plane 37 of the release ring 38. Then, when a hammer 3 carries out specified quantity retreat, the crevice through which the edge 35 of a clutch spring 5 passes between the stop ball 19 and the release ring 38 is made, and it is released from a stop. Then, since between strands 40 is opening a clutch spring 5 although it tends to return to the original length and it is shortened in the Annville 4 direction while it spreads to the path of a basis and separates from the cylinder container-liner side 14, strand 40 comrade collides with and it does not emit blow sound. If a clutch spring 5 separates from the cylinder container-liner side 14, a hammer 3 rotates by the driving shaft 2, moving forward to an early position by the compression spring 12 with the steel balls 10 and 11, the edge of a clutch spring 5 is stopped by the following stop ball 20 after half-rotation, and a clutch spring 5 will coil around each container-liner sides 14 and 29, and will bolt a screw by the rotation inertia of a hammer 3. This operation is repeated and a screw bundle is completed. From the first, even if it prepares a crevice between strands 40 on Annville 4, although going up similarly is expected, in order to become long to shaft orientations and to be contrary to small lightweight-ization by preparing a crevice, trouble must occur in operability, and an effect must be minimized. Although big torque is intermittently transmitted to Annville 4 through a clutch spring 5 by the above operation, generating of noise is suppressed without the sound by contact not occurring and strand 40 comrades of a clutch spring 5 colliding, since the hammer 3 and the interval of Annville 4 are maintained. moreover, in case a screw is loosened, although a driving shaft 2 is reversed, since pressing fixation of the edge 36 of a clutch spring 5 is carried out at the hole 34 of Annville 4, a clutch spring 5 repeats adhesion and maceration in the operation same to a hammer 3 and the each cylinder outer case sides 15 and 30 of Annville 4 as the time of a screw bundle, and loosens a screw The cross-section configurations of a clutch spring 5 may be configurations, such as a round shape. Furthermore, this invention is applicable to rotation blow type tools, such as a nut bundle besides the thread-fastening work described above, and hole dawn.

[0009]

[Effect of the Invention] Since according to this invention losing the shocking blow of a hammer, the hand of cut of Annville, and shaft orientations, of course, loses the impulsive sound by the spring clutch itself and a certainly intermittent turning effort is generated, low noise and the shock driver of low counteraction can be offered.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] one example of a shock driver which becomes this invention is shown — it is an ellipsis vertical section side elevation in part
[Drawing 2] It is the side elevation showing one example of a clutch spring which becomes this invention.
[Drawing 3] the time of the continuous action of a shock driver which becomes this invention is shown — it is an ellipsis vertical section side elevation in part
[Description of Notations]
1 — a shock driver and 2 — a driving shaft and 3 — a hammer and 4 — Annville and 5 — a clutch spring, and 6 and 7 — a driving shaft cam groove, and 8 and 9 — a hammer cam groove, and 10 and 11 — a steel ball and 13 — for a stop ball and 35, as for an inclined plane and 38, an edge and 37 are [a circular hole, and 19 and 20 / a cylinder slot, and 17 and 18 / a release ring and 40] strands

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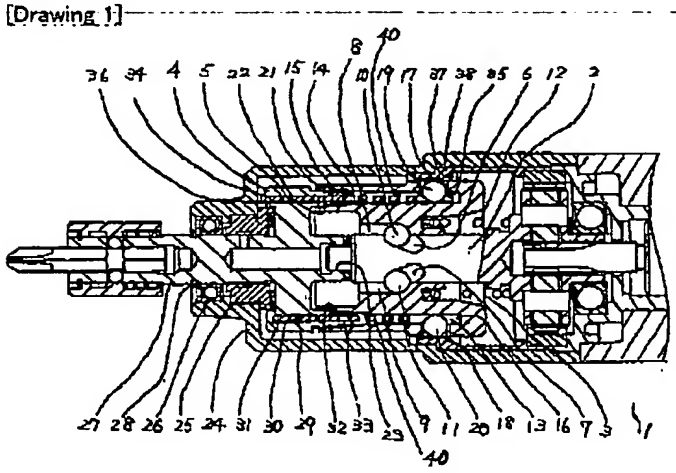
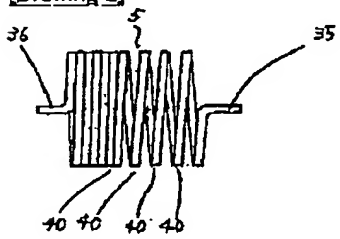
DRAWINGS

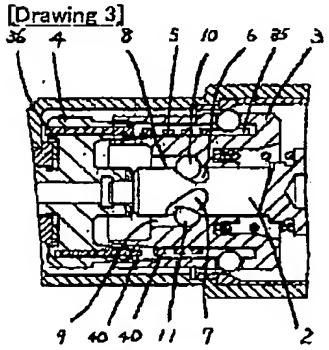
[Drawing 1]



[Drawing 2]



[Drawing 3]



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